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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/000,020	12/04/2001	Masamoto Tago	WNZ-2427	7977

466 7590 11/24/2003

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EXAMINER

NGUYEN, DILINH P

ART UNIT PAPER NUMBER

2814

DATE MAILED: 11/24/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/000,020	TAGO ET AL.	
	Examiner	Art Unit	
	DiLinh Nguyen	2814	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 July 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____. 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 1 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The phrase: "...a reaction layer is not formed or formation of the reaction layer is suppressed excessively..." is not understood.

A reaction layer is not formed. How can formation of the reaction layer is suppressed excessively?

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1, 3 and 5-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Vanfleteren et al. (U.S. Pat. 6555414) and Sarkhel et al. (U.S. Pat. 6010060) in view of Kakomura (U.S. Pat. 5540812).

Vanfleteren et al. disclose a semiconductor device (figs. 4A-5C) comprising the steps of:

a small area chip 1 (column 5, lines 27);

a laminate substrate 3;
electrode surfaces of the chip and the substrate which are arranged in opposition to each other;
positioning the semiconductor chip and the substrate (column 9, lines 15-18);
bonding the semiconductor chip and the substrate by pressing (column 9, lines 18-20);
entirely heating the semiconductor chip and the substrate so as to form the reaction layer 4 (column 9, lines 40-45) after lamination and bonding of all the semiconductor chips are completed.

Vanfleteren et al. fail to disclose the step of mounting a plurality of semiconductor chips or the substrate can be a chip.

Sarkhel et al. disclose a semiconductor flip chip device comprising: an IC chip 10 and a substrate 16, wherein the substrate can be a chip (fig. 1, column 4, lines 14-16). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the device of Vanfleteren et al. to obtain a semiconductor package of high performance as shown by Sarkhel et al.

Vanfleteren et al. and Sarkhel et al. fail to disclose the step of activating the electrode surfaces of the semiconductor chip and the substrate.

Kakomura discloses a semiconductor device comprising the step of:
activating step is carried out in order to remove an organic substance by an atomic beam of inactive gas excited by plasma (column 2, lines 26-40). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention

was made to modify the device of Vanfleteren et al. and Sarkhel et al. to improve an efficiency and design flexibility in mounting semiconductor device, as shown by Kakomura.

- Regarding claim 3, Vanfleteren et al. disclose a bump is formed on the semiconductor chip, and the electrode surface includes solder formed on the bump (column 5, lines 13-16 and 20).
- Regarding claims 5-6, Vanfleteren et al. disclose the reaction layer 4 comprises a bonding layer made of solder and the reaction layer is uniformly formed between the semiconductor chips (cover fig., column 5, line 20).
- Regarding claim 7, Kakomura discloses the activating step is carried out in order to remove an organic substance on the electrode surface (column 2, lines 26-30).
- Regarding claim 8, Vanfleteren et al. disclose the pressing step is carried out such that the bonding is performed via interatomic force by approaching the activated electrode surface to an interatomic distance.
- Regarding claims 9-12, Kakomura discloses the activating step is carried out by an atomic beam of inactive gas excited by plasma, irradiating radical fluorine, sputtering and reduction gas (column 2, lines 26-35 and column 5, lines 40-50).

3. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Vanfleteren et al. (U.S. Pat. 6555414) and Sarkhel et al. (U.S. Pat. 6010060) in view of Kakomura (U.S. Pat. 5540812) and further in view of Tanaka (U.S. Pat. 5889326).

Vanfleteren et al., Sarkhel et al. and Kakomura fail to disclose the step of wherein a supersonic wave is applied in addition to the pressing in the laminating and boding step.

Tanaka discloses the step of wherein a supersonic wave is applied in addition to the pressing in the boding step (column 4, lines 19-21). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the device of Vanfleteren et al., Sarkhel et al. and Kakomura to improve the reliability for the semiconductor package, as shown by Tanaka.

4. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Vanfleteren et al. (U.S. Pat. 6555414) and Sarkhel et al. (U.S. Pat. 6010060) in view of Kakomura (U.S. Pat. 5540812) and further in view of Senda et al. (U.S. Pat. 5576053).

Vanfleteren et al., Sarkhel et al. and Kakomura fail to disclose the step of the electrode surface includes solder containing an active component formed by electroless plating.

Senda et al. disclose the step of the electrode surface includes solder containing an active surface formed by electroless plating (abstract). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the device of Vanfleteren et al., Sarkhel et al. and Kakomura to provide a high mounting density for the semiconductor package, as shown by Senda et al.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DiLinh Nguyen whose telephone number is (703) 305-6983. The examiner can normally be reached on 8:00AM - 6:00PM (M-F).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (703) 308-4918. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

DLN
November 15, 2003



LONG PHAN
PRIMARY EXAMINER